OCCUPATIONAL ANALYSES SERIES

Appliance Service Technician

2005

Human Resources and Skills Development Canada
Ressources humaines et Développement des compétences Canada

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Appliance Service Technician

2005

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Human Resources
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The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this Occupational Analysis as the national standard for the occupation of Appliance Service Technician.

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OTHER RELATED OCCUPATIONAL TITLE

This analysis covers tasks performed by Appliance Service Technicians whose occupational title has been identified by some provinces and territories of Canada by the name of Major Appliance Service Technician.

LIST OF RED SEAL NATIONAL OCCUPATIONAL ANALYSES

TITLE	NOC* Code
Appliance Service Technician (2005)	7332
Automotive Painter (2005)	7322
Automotive Service Technician (2005)	7321
Baker (1997)	6252
Boilermaker (2003)	7262
Bricklayer (2000)	7281
Cabinetmaker (2000)	7272
Carpenter (2005)	7271
Concrete Finisher (1995)	7282
Construction Electrician (2003)	7241
Cook (2003)	6242
Electrical Rewind Mechanic (1999)	7333
Electronics Technician – Consumer Products (1997)	2242
Farm Equipment Mechanic (2000)	7312
Floorcovering Installer (2005)	7295
Glazier (2004)	7292
Hairstylist (2005)	6271
Heavy Duty Equipment Technician (2004)	7312
Industrial Electrician (2003)	7242
Industrial Instrument Mechanic (2000)	2243
Industrial Mechanic (Millwright) (1999)	7311
Insulator (Heat and Frost) (2000)	7293
Ironworker (Generalist) (1993)	7264
Lather (Interior Systems Mechanic) (2002)	7284
Machinist (2005)	7231
Metal Fabricator (Fitter) (2003)	7263

Mobile Crane Operator (1997)	7371
Motorcycle Mechanic (1995)	7334
Motor Vehicle Body Repairer (Metal and Paint) (2005)	7322
Oil Burner Mechanic (1997)	7331
Painter and Decorator (2000)	7294
Partsperson (2005)	1472
Plumber (2003)	7251
Powerline Technician (2004)	7244
Recreation Vehicle Mechanic (2000)	7383
Refrigeration and Air Conditioning Mechanic (2004)	7313
Roofer (1997)	7291
Sheet Metal Worker (1997)	7261
Sprinkler System Installer (2003)	7252
Steamfitter – Pipefitter (1996)	7252
Tilesetter (2004)	7283
Tool and Die Maker (2005)	7232
Transport Trailer Technician (2003)	7321
Truck and Transport Mechanic (2000)	7321
Welder (2004)	7265

* National Occupational Classification

Requests for these publications should be forwarded to:

Trades and Apprenticeship Division
Human Resources Partnerships
Human Resources and Skills Development Canada
140 Promenade du Portage, Phase IV, 5th Floor
Gatineau, Quebec K1A 0J9

These publications are also available to order or download online at: **www.red-seal.ca**.

A comparative listing of apprenticeship training programs across Canada may be accessed at **www.ellischart.ca**. The Ellis Chart also lists the current provincial and territorial trade names.

FOREWORD

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to co-operate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Human Resources and Skills Development Canada (HRSDC) sponsors a program, under the guidance of the Canadian Council of Directors of Apprenticeship (CCDA), to develop a series of occupational analyses.

The Occupational Analysis Program has the following objectives:

- to identify and group the tasks performed by skilled workers in particular occupations;
- to identify those tasks that are performed by skilled workers in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Standards "Red Seal" Examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility, in Canada, of apprentices and skilled workers;
- to supply employers and employees, and their associations, industries, training institutions and governments with analyses of the tasks performed in particular occupations.

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GUIDE TO ANALYSIS

DEVELOPMENT OF ANALYSIS

A draft analysis is developed by a committee of industry experts in the field led by a team of facilitators. This draft analysis identifies all the tasks performed in the occupation.

The draft is translated and reviewed by the NOA Team of HRSDC. A copy of this analysis is then forwarded to provincial/territorial authorities for review by specialists in the field. Their recommendations are assessed and incorporated into the final draft.

The occupational analysis is published in both official languages.

STRUCTURE OF ANALYSIS

To facilitate understanding of the nature of the occupation, the work performed is divided into the following divisions:

BLOCK – is the largest division within the analysis and reflects a distinct operation relevant to the occupation.

TASK – is the distinct activity that, combined with others, makes up the logical and necessary steps the worker is required to perform to complete a specific assignment within a "BLOCK".

SUB-TASK – is the smallest division into which it is practical to subdivide any work activity and, combined with others, fully describes all duties constituting a "TASK".

Supporting Knowledge & Abilities

The elements of skill and knowledge that an individual must acquire to adequately perform the sub-task.

Trends

Any shifts or changes in technology that affect the block.

Related Components

All components related to a specified block being undertaken by the Appliance Service Technician.

Tools and Equipment

All tools and equipment necessary for the Appliance Service Technician to perform the work on all given tasks identified within the block.

Context

A statement written to clarify the intent and meaning of blocks in the analysis.

VALIDATION METHOD

At the request of the Canadian Council of Directors of Apprenticeship (CCDA), the Standardization Sub-committee developed a method for validating the Red Seal National Occupational Analyses.

A draft of the analysis is sent to all jurisdictions for validation. Each jurisdiction rates the sub-tasks and applies percentage ratings to blocks and tasks. This method for the validation of the National Occupational Analysis identifies common core tasks across Canada for a specific occupation. This feature facilitates the weighting of the Interprovincial Standards "Red Seal" Examinations.

DEFINITIONS

YES: the sub-task is performed by workers in the occupation in a specific jurisdiction.

NO: the sub-task is not performed by workers in the occupation in a specific jurisdiction.

BLOCK %: the average number of questions (items), derived from the collective decision made by workers within the occupation from all areas of Canada, that will be placed on an interprovincial examination to assess each block of the analysis.

TASK %: the average number of questions (items), derived from the collective decision made by workers within the occupation from all areas of Canada, that will be placed on an interprovincial examination to assess each task of the analysis.

NV: Not Validated by a province/territory.

ND: Not Designated in a province/territory.

PROVINCIAL/TERRITORIAL ABBREVIATIONS

NL: Newfoundland and Labrador
NS: Nova Scotia
PE: Prince Edward Island
NB: New Brunswick
QC: Quebec
ON: Ontario
MB: Manitoba
SK: Saskatchewan
AB: Alberta
BC: British Columbia
NT: Northwest Territories
YT: Yukon
NU: Nunavut

COMMON CORE

The criteria for determining common core depend on the performance of sub-tasks. If at least 70% of the responding jurisdictions (excluding NVs and NDs) perform a sub-task, it shall be considered common core.

Interprovincial Standards "Red Seal" Examinations are based on the common core identified through this validation process. Validation identifies what will be assessed through the interprovincial examination.

BLOCK AND TASK WEIGHTING (APPENDIX C)

This appendix represents the block and task percentages as submitted by each jurisdiction.

Each jurisdiction, with the use of a provincial/territorial occupational advisory committee, validates the content, places percentages on blocks and tasks, and indicates whether or not the sub-tasks are performed by the skilled workers within the occupation. The results of this exercise are submitted to the NOA Team who then analyzes the data and develops this appendix which provides the individual jurisdictional validation results as well as the national averages of all responses.

PIE CHART (APPENDIX D)

The graph depicts the national percentages assigned to blocks in the analysis.

SCOPE OF THE APPLIANCE SERVICE TECHNICIAN OCCUPATION

Appliance service technicians repair and service consumer related appliance products including, but not limited to:

- electric ranges
- electric refrigerators
- electric freezers
- dishwashers
- hood fans
- waste disposers
- ice makers
- electric clothes dryers
- clothes washers
- electric water heaters
- window air conditioners
- residential air conditioners
- gas ranges
- gas refrigerators
- gas freezers
- microwave ovens
- gas barbecues
- waste compactors
- water coolers
- gas clothes dryers
- central vacuum systems
- vacuum cleaners
- dehumidifiers
- humidifiers

Appliance service technicians determine the appliance failure by performing diagnostic procedures with testing equipment. Based on their assessment, they provide work and cost estimates to the customer. They may provide installation and maintenance services. They disassemble appliances, repair, remove and replace components and reassemble appliances. They perform recovery and proper disposal of refrigerant gases. Appliance service technicians are responsible for evaluating the repair and demonstrating the use and care of the appliance to the customer.

Appliance service technicians may specialize in certain types or brands of appliances. They may be self-employed or employed by retail and manufacturer repair departments, utility companies or appliance service shops. They may work in the shop or travel to work onsite. The work environment may vary from comfortable shops to cramped workspaces.

Key attributes for people entering this trade are communication, organizational and problem-solving skills. The physical considerations of the work include bending, stooping, crouching and moving large heavy appliances. There is some risk of physical injury due to electrical shocks, cuts, burns or muscle strain.

Appliance service technicians may consult and coordinate with other tradespeople such as refrigeration and air conditioning mechanics, electricians, gas fitters and plumbers.

With experience, appliance service technicians may move into training, sales or supervisory positions. They may also work in their own appliance service business.

OCCUPATIONAL OBSERVATIONS

Appliances are becoming integrated with electronic technology. Therefore, appliance service technicians need to continually upgrade their skills in electronic diagnosis, circuitry and microprocessors. Appliance components are more disposable, making component replacement more common than component repair.

The use of computers is becoming more commonplace and provides appliance service technicians with manufacturer information in order to repair appliances.

SAFETY

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties are aware of circumstances and conditions that may lead to injury or harm. Safe learning experiences and environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that a safety-conscious attitude and work practices contribute to a healthy, safe and accident-free working environment.

It is imperative to apply and be familiar with the Occupational Health and Safety Acts and Workplace Hazardous Material Information System (WHMIS) Regulations. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

As safety education is an integral part of training in all jurisdictions, personal safety practices are not recorded in this document. However, the technical safety aspect relating to each task and sub-task are included throughout this analysis.

ANALYSIS

BLOCK A

OCCUPATIONAL SKILLS

Context: *The use of quality tools creates more efficiency in the trade. In addition, organizational, communication and public relation skills are fundamental to an appliance service technician's success.*

Trends: *Tools in the appliance servicing industry are becoming more sophisticated and specialized c omputers are more common in technicians' work and computer skills are becoming more important. The ability to communicate complex information is becoming more important.*

Related Components: All components of the trade.

Tools and Equipment: See Appendix A.

Task 1 Uses tools and equipment.

Sub-task

1.01 Uses hand tools.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

1.01.01	knowledge of types of hand tools such as hammers, screwdrivers, pliers and nut drivers
1.01.02	knowledge of limitations of use of hand tools
1.01.03	ability to organize hand tools
1.01.04	ability to select hand tools
1.01.05	ability to maintain hand tools

Sub-task

1.02 Uses power tools.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

1.02.01	knowledge of types of power tools such as impact tools, drills and vacuum pumps
1.02.02	knowledge of limitations of use of power tools
1.02.03	ability to organize power tools
1.02.04	ability to select power tools
1.02.05	ability to maintain power tools

Sub-task

1.03 Uses diagnostic and measuring tools.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

1.03.01	knowledge of types of general purpose diagnostic and measuring tools such as multimeter and thermometer
1.03.02	knowledge of diagnostic and measuring tools for refrigeration systems such as weigh scales, charging cylinders and compound gauges
1.03.03	knowledge of diagnostic and measuring tools for gas systems such as combustible gas leak detector, carbon monoxide detector and manometers
1.03.04	ability to organize diagnostic and measuring tools
1.03.05	ability to select diagnostic and measuring tools

1.03.06	ability to calibrate diagnostic and measuring tools
1.03.07	ability to maintain diagnostic and measuring tools

Sub-task

1.04 Uses soldering and brazing equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

1.04.01	knowledge of types of soldering and brazing equipment such as torches and soldering guns
1.04.02	knowledge of soldering/brazing gases such as propane, butane and acetylene
1.04.03	knowledge of alloys and fluxes
1.04.04	knowledge of Transportation of Dangerous Goods (TDG) regulations
1.04.05	knowledge of Workplace Hazardous Material Information System (WHMIS)
1.04.06	knowledge of ventilation requirements
1.04.07	ability to recognize flammable materials
1.04.08	ability to match alloy to specific component to be soldered or brazed
1.04.09	ability to organize soldering and brazing equipment
1.04.10	ability to select soldering and brazing equipment
1.04.11	ability to maintain soldering and brazing equipment

Sub-task

1.05 Uses recovery equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

1.05.01	knowledge of operating procedures
1.05.02	knowledge of Transportation of Dangerous Goods (TDG) regulations
1.05.03	knowledge of storage procedures for recovery equipment and pressurized gases
1.05.04	ability to perform maintenance such as changing oil and filter, and checking for leaks
1.05.05	ability to identify type of refrigerant
1.05.06	ability to organize recovery equipment
1.05.07	ability to select recovery equipment
1.05.08	ability to maintain recovery equipment

Sub-task

1.06 Uses personal protective equipment (PPE) and safety equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

1.06.01	knowledge of types of PPE such as goggles, gloves and safety boots
1.06.02	knowledge of location of PPE and safety equipment
1.06.03	knowledge of Occupational Health and Safety regulations
1.06.04	ability to select PPE and safety equipment

1.06.05	ability to maintain PPE and safety equipment
1.06.06	ability to use fire extinguisher

Sub-task

1.07 Uses computers. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

1.07.01	knowledge of operating system
1.07.02	ability to use installed programs
1.07.03	ability to research on-line for information such as parts and documentation
1.07.04	ability to communicate with email and on-line chat

Task 2 Organizes work.

Sub-task

2.01 Uses documentation. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

2.01.01	knowledge of types of documentation such as manuals, charts and work orders
2.01.02	ability to locate information such as rating plates
2.01.03	ability to interpret and extract specific information
2.01.04	ability to access sections of jurisdictional codes such as plumbing, gas and electrical, applicable to the appliance service industry

2.01.05	ability to access Material Safety Data Sheets (MSDS)
2.01.06	ability to document service information such as rating plate information, customer requests, appliance history, service details, estimates and billing

Sub-task

2.02 Communicates with others. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

2.02.01	knowledge of public relations
2.02.02	ability to verify customer's request
2.02.03	ability to educate customer about use and care of appliance
2.02.04	ability to use communication media such as telephones, two-way radios and email
2.02.05	ability to communicate with manufacturers
2.02.06	ability to communicate parts information when ordering parts
2.02.07	ability to communicate with supervisors
2.02.08	ability to consult with colleagues
2.02.09	ability to communicate with other tradespeople

Sub-task

2.03 Manages parts and materials. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

2.03.01	knowledge of parts and materials required

2.03.02 ability to maintain stock of parts and materials

2.03.03 ability to order parts and materials

Sub-task

2.04 Verifies appliance and component operation following servicing or installation.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

2.04.01 knowledge of normal appliance operations

2.04.02 knowledge of testing techniques

2.04.03 ability to test entire operation such as for leaks, noise, vibration, installation and performance

BLOCK B

REMOVAL AND INSTALLATION PROCEDURES

Context: *Proper installation contributes to the lifespan of the appliance. Proper handling can prevent damage to the appliance and property, as well as contributing to personal and public safety.*

Trends: *More appliances are being installed in confined spaces. This leads to a need for more expertise in gaining access to appliances for servicing and maintenance.*

Related Components: Water hoses, electrical wiring and receptacles, compression fittings, clamps, vents, thread sealer, hose gaskets, adhesives, wire nuts, washers, piping material, tubing, conversion kits, valves, regulators, orifices, shipping material, protective covers, access panels.

Tools and Equipment: Personal protective equipment and safety equipment, common service tools, shop tools, measuring tape.

Task 3 Prepares installation site.

Sub-task

3.01 Checks flooring support.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

Supporting Knowledge & Abilities

3.01.01	knowledge of types of flooring construction such as wood, floating floors and ceramic tile
3.01.02	knowledge of flooring requirements for various appliances
3.01.03	ability to visually inspect the flooring support
3.01.04	ability to identify unsuitable flooring

Sub-task

3.02 Verifies appliance location.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

3.02.01	knowledge of appliance dimensions
3.02.02	knowledge of manufacturers' specifications such as clearances required, accessibility and support requirements
3.02.03	ability to position appliance taking into consideration factors such as door swing, room size and accessibility
3.02.04	ability to measure dimensions such as cabinets and counter height

Sub-task

3.03 Verifies water, power, drain, venting and gas connections.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

3.03.01	knowledge of manufacturers' requirements
3.03.02	ability to access sections of jurisdictional codes such as plumbing, gas and electrical, applicable to the appliance service industry
3.03.03	ability to visually verify connection locations
3.03.04	ability to recognize unsuitable connections such as worn and damaged valves, and improper drain height and size

Sub-task

3.04 Updates venting.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

3.04.01	knowledge of types of venting equipment such as dryers, gas appliances and over-the-range products
3.04.02	knowledge of venting requirements for various appliances
3.04.03	knowledge of types of venting materials such as aluminium, galvanized and plastic
3.04.04	knowledge of manufacturers' specifications
3.04.05	ability to identify unsuitable venting
3.04.06	ability to plan venting layout
3.04.07	ability to clean existing venting
3.04.08	ability to upgrade existing venting system
3.04.09	ability to connect venting

Task 4 Handles appliance.

Sub-task

4.01 Uncrates appliance.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

4.01.01	knowledge of uncrating requirements such as tools, labour and space
4.01.02	knowledge of types of shipping materials such as suspension bolts, clips, styrofoam and tape

4.01.03	ability to follow manufacturers' instructions for uncrating
4.01.04	ability to remove and dispose of crating materials
4.01.05	ability to remove shipping materials

Sub-task

4.02 Moves appliance. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

4.02.01	knowledge of appliance weight and size
4.02.02	knowledge of moving procedures such as lifting points and tilting appliance
4.02.03	knowledge of required moving space
4.02.04	knowledge of when to use mechanical aids and protective materials
4.02.05	ability to perform proper lifting and moving procedures
4.02.06	ability to use mechanical aids such as dollies, straps and mechanical lifts
4.02.07	ability to protect flooring using aids such as mats and slides

Sub-task

4.03 Sets up appliance. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

4.03.01	knowledge of levelling requirements of various appliances
4.03.02	ability to protect flooring and work area

4.03.03	ability to position appliance
4.03.04	ability to level appliance
4.03.05	ability to secure appliance

Task 5 Disconnects/reconnects appliance.

Sub-task

5.01 Disconnects/reconnects water, power, drain, gas and venting.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

Supporting Knowledge & Abilities

5.01.01	knowledge of types of connection components such as hoses, compression fittings, wire nuts and clamps
5.01.02	knowledge of types of water and gas valves such as ball, gate and schraeder
5.01.03	knowledge of wire sizing and positioning
5.01.04	ability to cap off water, power, gas, drains and venting
5.01.05	ability to access utility shut-off locations
5.01.06	ability to shut off and turn on utilities
5.01.07	ability to prepare connections using materials such as thread sealer, hose gaskets and adhesives
5.01.08	ability to bleed/purge gas and water lines

Sub-task

5.02 Performs final inspection of connections.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

5.02.01	knowledge of hose position and routing
5.02.02	knowledge of locations of protective covers and access panels
5.02.03	ability to test for and identify leaks
5.02.04	ability to check mechanical connections for water, gas and venting
5.02.05	ability to ensure secure electrical wiring
5.02.06	ability to reinstall protective covers and access panels

Sub-task

5.03 Converts gas appliances.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

5.03.01	knowledge of types of gas such as propane and natural gas
5.03.02	knowledge of types of appliances that can be converted such as ranges, dryers and barbecues
5.03.03	knowledge of conversion procedures such as component replacement and adjusting gas pressure, valves and regulators
5.03.04	ability to replace and adjust orifices
5.03.05	ability to install regulators
5.03.06	ability to resize orifices

BLOCK C

ELECTRICAL AND ELECTRONIC SYSTEMS

Context: *Electronic and electrical systems control all functions of appliance operation. Servicing them is the most technical part of a technician's job.*

Trends: *In the name of energy-efficiency, manufacturers are incorporating more direct current (DC) and electronic components into appliances. Appliances' electronic components are becoming more sophisticated, with the ability to perform self-diagnostics.*

Related Components: Switches, relays, elements, timers, clocks, thermostats, motors, printed circuit (PC) boards, speed control, solenoids, DC drive mechanism, sensors, interface boards, wires, terminals, connectors, cables.

Tools and Equipment: Personal protective equipment and safety equipment, common measuring/testing equipment, common service tools, soldering gun.

Task 6 Diagnoses electrical and electronic components.

Sub-task

6.01 Verifies power supply.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

6.01.01	knowledge of power supply system
6.01.02	knowledge of testing procedures
6.01.03	ability to use meters and test equipment
6.01.04	ability to identify appliance power requirements according to rating plate
6.01.05	ability to ensure power availability

Sub-task

6.02 Inspects electrical and electronic components and circuits.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

6.02.01 knowledge of electrical and electronic components such as switches, motors and PC boards

6.02.02 knowledge of component functions

6.02.03 knowledge of physical appearance of components

6.02.04 ability to identify defects such as burnt wires, loose connections and broken elements

6.02.05 ability to access components for testing

6.02.06 ability to verify integrity of circuit components such as wires, terminals, connectors and cables

Sub-task

6.03 Tests electrical and electronic components and circuits.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

6.03.01 knowledge of types of procedures and test points for testing components and circuits such as continuity, voltage and amperage

6.03.02 knowledge of specified component values

6.03.03 ability to perform tests using equipment such as meters and test equipment

6.03.04 ability to interpret test results

6.03.05 ability to trace circuits

Sub-task

6.04 Reads schematics and flow charts.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

6.04.01	knowledge of types of wiring diagrams such as schematics, pictorial and flow charts
6.04.02	ability to locate wiring diagrams on appliance
6.04.03	ability to interpret legends and symbols
6.04.04	ability to trace circuits on wiring diagrams

Task 7 Performs electrical and electronic repair.

Sub-task

7.01 Repairs wiring and connectors.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

7.01.01	knowledge of types of wires such as high temperature, solid and braided
7.01.02	knowledge of types of connectors such as high heat/low heat, weatherproof, heat-sealed and crimp-on
7.01.03	ability to identify connector and wire gauge ratings
7.01.04	ability to select wiring and connectors
7.01.05	ability to identify circuit faults
7.01.06	ability to replace wiring and connectors
7.01.07	ability to fasten connectors

Sub-task

7.02 Repairs electrical and electronic components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

7.02.01	knowledge of types of electrical components such as switches, elements and motors
7.02.02	knowledge of types of electronic components such as PC boards, relays and transformers
7.02.03	knowledge of electronic circuitry
7.02.04	knowledge of types of motors such as brushed, brushless, variable speed and AC/DC
7.02.05	ability to locate components requiring repair or replacement
7.02.06	ability to replace parts on components
7.02.07	ability to adjust controls and switches
7.02.08	ability to correct connections
7.02.09	ability to reprogram interface boards

BLOCK D

MECHANICAL SYSTEMS

Context: *Mechanical systems consist of the drive system, cabinet structure and suspension system. They provide the structure, operation and appearance of appliances. Appliance service technicians diagnose, repair and replace failed mechanical system components. This is the most physically demanding work for the technician.*

Trends: *Appliances are becoming more environmentally friendly and energy efficient. The movement to lighter materials often lowers shipping and manufacturing costs. Mechanical components are becoming less serviceable. Therefore, appliance service technicians are spending more time working on high-end appliances. These repairs require a more educated appliance service technician.*

Related Components: **Drive systems:** transmissions, clutches, belts, motors, pulleys, bearings;

Suspension systems: cables, shocks, springs, rods, snubbers;

Cabinets: doors, panels, trim, hinges, legs, rollers, supports.

Tools and Equipment: Personal protective equipment and safety equipment, common service tools, specialty dishwasher, washer and dryer tools, shop tools, torches, tips.

Task 8 Diagnoses drive systems.

Sub-task

8.01 Performs sensory inspections. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

8.01.01	knowledge of appliance make and model
8.01.02	knowledge of components and layout
8.01.03	knowledge of drive system operations and function
8.01.04	ability to identify components such as belts, clutches, pulleys and transmissions

8.01.05 ability to identify worn and failed parts

8.01.06 ability to identify abnormal sounds and smells

Sub-task

8.02 Tests drive system components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

8.02.01 knowledge of system operation

8.02.02 ability to access components

8.02.03 ability to identify the cause of failure

8.02.04 ability to identify worn and failed components

8.02.05 ability to isolate components for testing

8.02.06 ability to test run system

Task 9 Assesses cabinets, consoles and suspension systems.

Sub-task

9.01 Visually inspects cabinets and consoles.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

9.01.01 knowledge of types of appliance structure such as cabinets, doors and panels

9.01.02 knowledge of types of cabinet and console damage such as dents, scratches, distortions, cracks and paint defects

9.01.03 ability to access appliance structures

9.01.04	ability to identify damage and defect causes such as improper use, delivery damage and manufacturer error
9.01.05	ability to check operation of moving parts

Sub-task

9.02 Diagnoses suspension systems. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

9.02.01	knowledge of types of suspension systems
9.02.02	knowledge of types of system components such as shocks, springs, snubbers and cables
9.02.03	ability to access suspension system
9.02.04	ability to identify worn, broken and loose components
9.02.05	ability to inspect components visually and by touch
9.02.06	ability to identify the cause of failure

Task 10 Repairs drive systems.

Sub-task

10.01 Repairs drive system components. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

10.01.01	knowledge of rebuilding procedures
10.01.02	knowledge of repairing procedures
10.01.03	knowledge of acceptable component tolerances

10.01.04	ability to determine if components require repairing or replacing
10.01.05	ability to adjust components such as motors, clutches and belt tensioners
10.01.06	ability to lubricate bearings, linkages, springs and belts
10.01.07	ability to rebuild transmission and clutches

Sub-task

10.02 Replaces drive system components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

10.02.01	knowledge of replacement procedures
10.02.02	knowledge of drive system construction
10.02.03	knowledge of acceptable component tolerances
10.02.04	ability to access components
10.02.05	ability to determine when components require replacing
10.02.06	ability to identify compatible parts
10.02.07	ability to modify replacement parts

Task 11 Repairs cabinets, consoles and suspension systems.

Sub-task

11.01 Repairs cabinet and console components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

11.01.01	knowledge of components that can be repaired
11.01.02	knowledge of types of materials such as metals, plastics and composites
11.01.03	ability to perform body work such as removing dents, straightening panels and touching up marks
11.01.04	ability to replace parts such as hinges, bushings and panels
11.01.05	ability to repair plastic parts
11.01.06	ability to replace and align door seals

Sub-task

11.02 Services suspension system.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

11.02.01	knowledge of procedures to replace and reassemble suspension system
11.02.02	knowledge of acceptable component tolerances
11.02.03	ability to adjust suspension system
11.02.04	ability to lubricate suspension system
11.02.05	ability to replace failed parts

BLOCK E

WATER SYSTEMS

Context: *Any appliance that uses or contains water has a water system. Proper installation and servicing of water systems can maintain correct operation and prevent injury and property damage.*

Trends: *Energy saving appliances using less water are becoming more common. Water temperatures are becoming more precise, improving machine performance. Water filtration systems are becoming more efficient.*

Related Components: Water valves, aerators, water controls, discharge valves, siphon breaks, pumps, hoses, seals, check valves, fasteners, filters, containers.

Tools and Equipment: Personal protective equipment and safety equipment, common measuring/testing equipment, common service tools, specialty dishwasher, washer and dryer tools, soldering and brazing tools.

Task 12 Diagnoses water systems.

Sub-task

12.01 Verifies water supply.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

12.01.01	knowledge of supply requirements such as pressure, temperature and water quality
12.01.02	ability to assess water pressure
12.01.03	ability to measure water temperature
12.01.04	ability to measure water hardness

Sub-task

12.02 Diagnoses water inlet and discharge components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

12.02.01	knowledge of water inlet components such as water valves, aerators and water controls
12.02.02	knowledge of water discharge components such as discharge valves, siphon breaks and pumps
12.02.03	knowledge of component functions
12.02.04	ability to identify and locate components
12.02.05	ability to test components

Sub-task

12.03 Isolates water leaks.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

12.03.01	knowledge of water system components
12.03.02	knowledge of component functions
12.03.03	ability to perform sensory diagnosis of leaks by seeing, feeling and hearing
12.03.04	ability to confirm source of leak
12.03.05	ability to inspect components

Task 13 Repairs water systems.

Sub-task

13.01 Replaces water system components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

13.01.01	knowledge of water system components such as water valves, hoses, seals, water controls, siphon breaks and aerators
13.01.02	knowledge of manufacturers' specifications and procedures
13.01.03	ability to calibrate mechanical and electrical components after replacement
13.01.04	ability to disassemble and reassemble components

Sub-task

13.02 Repairs water system components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

13.02.01	knowledge of water system components such as water valves, hoses, seals, water controls, siphon breaks and aerators
13.02.02	knowledge of component functions
13.02.03	knowledge of fasteners such as fittings and clamps
13.02.04	ability to disassemble and reassemble components
13.02.05	ability to remove obstructions from drains, vents, filters and pumps

13.02.06	ability to secure drain hoses
13.02.07	ability to install fasteners

BLOCK F

AIR SYSTEMS

Context: *Air systems are present in all appliances. Air systems circulate air, transfer heat, remove moisture and aid in combustion.*

Trends: *Air systems are becoming more efficient using electronic controls. Fans are being manufactured with variable running speeds.*

Related Components: Fans, blowers, motors, controls, condensers, evaporators, ducting.

Tools and Equipment: Personal protective equipment and safety equipment, common measuring/testing equipment, common service tools, shop tools.

Task 14 Diagnoses static air systems.

Sub-task

14.01 Checks location of appliance. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

14.01.01	knowledge of appliance clearances necessary for air circulation
14.01.02	knowledge of air requirements for appliance operation
14.01.03	ability to follow manufacturers' installation specifications for clearances and circulation

Sub-task

14.02 Verifies air circulation. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

14.02.01	knowledge of appliance operation

14.02.02	knowledge of heat principles such as conduction, convection and radiation
14.02.03	ability to monitor air movement

Task 15 Diagnoses forced air systems.

Sub-task

15.01 Checks installation.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

15.01.01	knowledge of appliance operation
15.01.02	knowledge of location and function of components
15.01.03	ability to interpret manufacturers' installation specifications

Sub-task

15.02 Performs sensory inspection of forced air system.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

15.02.01	knowledge of normal noise level and vibration
15.02.02	ability to isolate source of abnormal noise, odour and vibration
15.02.03	ability to identify the cause of the abnormal noise, odour and vibration

Sub-task

15.03 Checks air flow.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

15.03.01	knowledge of air requirements for application
15.03.02	knowledge of location and function of components
15.03.03	ability to verify airways and locate obstructions
15.03.04	ability to monitor air movement

Sub-task

15.04 Checks forced air system components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

15.04.01	knowledge of forced air system components such as fans, blowers, motors and controls
15.04.02	knowledge of location and function of components
15.04.03	ability to test components

Task 16 Repairs static air systems.

Sub-task

16.01 Relocates appliance.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

16.01.01 knowledge of heat principles such as conduction, convection and radiation

16.01.02 knowledge of appliance clearances necessary for air circulation

16.01.03 knowledge of air requirements for appliance operation

16.01.04 ability to follow manufacturers' installation specifications for clearances and circulation

16.01.05 ability to disable appliance due to unsafe operating conditions

16.01.06 ability to advise customer of potential solutions for air requirements and document recommendation

Sub-task

16.02 Cleans condensers and evaporators.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

16.02.01 knowledge of appliance operation

16.02.02 knowledge of heat principles such as conduction, convection and radiation

16.02.03 ability to use cleaning techniques such as vacuuming, brushing, defrosting and using chemicals

16.02.04 ability to access condensers and evaporators

Sub-task

16.03 Clears static air venting.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

16.03.01 knowledge of air circulation

16.03.02 ability to identify intake and outgoing air

16.03.03 ability to access vent ducts

16.03.04 ability to remove obstructions

Task 17 Repairs forced air systems.

Sub-task

17.01 Clears airways.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

17.01.01 knowledge of forced air circulation

17.01.02 ability to use cleaning techniques such as vacuuming, brushing and using chemicals

17.01.03 ability to remove obstructions

Sub-task

17.02 Replaces forced air system components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

17.02.01 knowledge of types of components such as fans, blowers, motors, controls and switches

17.02.02	knowledge of normal operation of components
17.02.03	ability to identify replacement parts
17.02.04	ability to disassemble and reassemble components

BLOCK G

REFRIGERATION SYSTEMS

Context: *Due to environmental regulations, it is important for an appliance service technician to fully understand the usage, safe handling and recovery of refrigerants. When diagnosing and repairing sealed refrigeration systems, it is important that technicians have a full understanding of the refrigeration cycle to properly restore the integrity of the sealed system. Appliance service technicians may also work on thermal electric refrigeration systems which are used for small water coolers, fridges and camping coolers.*

Trends: *Compressors are now being built to operate at variable speeds to increase efficiency of the refrigeration cycle and reduce power consumption.*

Related Components: Silver solder, Sil-Fos, flux, sandpaper, refrigerant, compressor, drier, access valves, couplers, evaporators, condenser, heat exchanger, copper tubing, fans, controls.

Tools and Equipment: Personal protective equipment and safety equipment, common service tools, specialty refrigeration tools, soldering and brazing tools, clamp-on meter, temperature recorders, thermometer, shop tools.

Task 18 Diagnoses refrigeration systems.

Sub-task

18.01 Checks for system leaks.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

Supporting Knowledge & Abilities

18.01.01	knowledge of absorption and mechanical refrigeration system processes
18.01.02	knowledge of frost patterns of evaporator
18.01.03	knowledge of operating temperatures and pressures
18.01.04	knowledge of imperial and metric systems
18.01.05	ability to visually identify leaks

18.01.06 ability to use leak detection equipment

18.01.07 ability to gain access to components such as condenser, evaporator and compressor

Sub-task

18.02 Checks condenser and drier temperature and air flow.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

18.02.01 knowledge of static and forced air flow systems

18.02.02 knowledge of clearance requirements according to manufacturers' specifications

18.02.03 knowledge of drier position and function

18.02.04 ability to identify condenser and drier temperature

18.02.05 ability to use temperature testing equipment

18.02.06 ability to identify air flow problems such as failed fan component, dirty condenser and frosted evaporator

Sub-task

18.03 Observes pressure of sealed refrigeration system.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

18.03.01 knowledge of placement of access valve

18.03.02 knowledge of high and low side pressures

18.03.03 ability to seat access valve

18.03.04 ability to hook up and read gauges

Sub-task

18.04 Checks thermal electric refrigeration system. **Supporting Knowledge & Abilities**

(NOT COMMON CORE)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	no	no	yes	ND	NV

18.04.01	knowledge of thermal electric system operation
18.04.02	knowledge of operating temperatures
18.04.03	knowledge of static and forced air flow systems
18.04.04	knowledge of clearance requirements according to manufacturers' specifications
18.04.05	knowledge of power supply
18.04.06	ability to use temperature testing equipment
18.04.07	ability to use meters and testing equipment
18.04.08	ability to interpret test results

Task 19 Recovers refrigerant.

Sub-task

19.01 Assesses type of refrigerant. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

19.01.01	knowledge of types of refrigerants such as 134A, R12 and R22
19.01.02	knowledge of metric and imperial systems
19.01.03	ability to determine type of refrigerant

19.01.04	ability to locate and understand rating plate
19.01.05	ability to assess quantity of refrigerant

Sub-task

19.02 Accesses sealed system.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

19.02.01	knowledge of access valve installation methods such as soldered/brazed or pierced
19.02.02	ability to seat access valve

Sub-task

19.03 Evacuates sealed system to recovery units and recovery bottle.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

19.03.01	knowledge of recovery processes
19.03.02	knowledge of recovery equipment condition
19.03.03	ability to identify gauge for type of refrigerant to avoid cross-contamination
19.03.04	ability to secure hose to access valve and recovery equipment
19.03.05	ability to verify complete evacuation
19.03.06	ability to remove access valve

Task 20 Repairs refrigeration systems.

Sub-task

20.01 Prepares tubing for connections.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

Supporting Knowledge & Abilities

20.01.01	knowledge of types of tubing such as steel and copper
20.01.02	knowledge of contaminants such as metal fragments and sanding dust
20.01.03	ability to clean by sanding tubing
20.01.04	ability to swedge and cut tubing
20.01.05	ability to flare tubing and select fasteners

Sub-task

20.02 Replaces sealed refrigeration system components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

Supporting Knowledge & Abilities

20.02.01	knowledge of brazing/soldering materials to be used such as Sil-Fos, silver and flux
20.02.02	knowledge of drier position
20.02.03	knowledge of required tubing temperature while brazing/soldering
20.02.04	ability to remove components
20.02.05	ability to install components
20.02.06	ability to disassemble and reassemble appliance
20.02.07	ability to inspect joints

Sub-task

20.03 Evacuates system.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

20.03.01	knowledge of gauges and vacuum pumps
20.03.02	knowledge of vacuum pressure readings
20.03.03	ability to connect and read gauges
20.03.04	ability to connect vacuum pump

Sub-task

20.04 Charges system.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

20.04.01	knowledge of operating pressure
20.04.02	knowledge of charging procedures according to manufacturers' specifications
20.04.03	ability to read rating plate for type and amount of refrigerant
20.04.04	ability to measure refrigerant
20.04.05	ability to connect gauges to charging container
20.04.06	ability to reseal system

Sub-task

20.05 Replaces thermal electric system components.

Supporting Knowledge & Abilities

(NOT COMMON CORE)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	no	no	yes	ND	NV

20.05.01	knowledge of types of components such as switches and fans
20.05.02	knowledge of types of electronic components such as PC boards
20.05.03	knowledge of electronic circuitry
20.05.04	ability to remove components
20.05.05	ability to install components
20.05.06	ability to disassemble and reassemble appliance

BLOCK H

GAS SYSTEMS

Context: *Many types of appliances are run by gas. When working on gas appliances, safety is the number one priority. Appliance service technicians must be fully versed in the code regulations and gas properties for the safe use of gas-fired appliances. With the increase of airtight buildings, it is imperative for the technician to recognize if sufficient make-up air is present for proper combustion of a gas-fired appliance.*

Trends: *None identified.*

Related Components: Gas valves, igniters, tubing/piping, fittings, sealants, regulators, clamps, thermocouplers, vent pipes, spark modules, burners, thermopiles, switches.

Tools and Equipment: Personal protective equipment and safety equipment, common measuring/testing equipment, common service tools, specialty gas tools, shop tools.

Task 21 Diagnoses gas system components and supply.

Sub-task

21.01 Identifies type of gas.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

Supporting Knowledge & Abilities

21.01.01	knowledge of types of gas such as propane and natural gas
21.01.02	knowledge of gas characteristics such as volatility, density and smell
21.01.03	ability to identify ambient gas by smell
21.01.04	ability to read rating plate

Sub-task

21.02 Assesses flame quality.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

21.02.01	knowledge of flame colour and size
21.02.02	knowledge of air/fuel mixture
21.02.03	knowledge of static pressure according to rating plate
21.02.04	knowledge of orifice sizes
21.02.05	knowledge of primary and secondary air
21.02.06	ability to visually inspect flame

Sub-task

21.03 Checks ignition system.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

21.03.01	knowledge of types of ignition systems such as electronic igniter, pilot light and glow coil
21.03.02	knowledge of location of ignition system
21.03.03	ability to check electronic ignition components such as glow coil, spark module and switches
21.03.04	ability to determine sufficient flame by visual inspection

Sub-task

21.04 Checks for gas leaks.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

21.04.01	knowledge of safety procedures pertaining to gas leaks
21.04.02	knowledge of types of gas fittings such as compression, flare and National Pipe Thread (NPT)
21.04.03	knowledge of gas characteristics such as volatility, density and smell
21.04.04	ability to perform gas leak test

Sub-task

21.05 Verifies gas valve operation.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

21.05.01	knowledge of types of gas valves
21.05.02	knowledge of gas valve operations
21.05.03	ability to adjust gas pressure
21.05.04	ability to identify improper operation of a gas valve

Sub-task

21.06 Ensures conversion has been performed for type of gas.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

21.06.01	knowledge of code requirements

21.06.02	knowledge of manufacturers' specifications
21.06.03	knowledge of types of gases such as propane and natural gas
21.06.04	ability to recognize if appliance matches the gas supply

Task 22 Repairs gas system components.

Sub-task

22.01 Replaces gas system components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

22.01.01	knowledge of shut off procedures such as location, tag and lock-out procedures
22.01.02	knowledge of test and adjustment procedures
22.01.03	knowledge of safety components
22.01.04	ability to remove and install components
22.01.05	ability to recognize flame quality
22.01.06	ability to adjust air shutters and gas pressures
22.01.07	ability to replace orifices

Sub-task

22.02 Repairs gas leaks.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	ND	yes	ND	ND	yes	yes	yes	ND	NV

22.02.01	knowledge of safety procedures
22.02.02	knowledge of gas characteristics such as volatility, density and smell

22.02.03	knowledge of joint repair procedures
22.02.04	knowledge of material used for repair such as pipe dope, tape and "o" rings
22.02.05	knowledge of gas leak test procedures such as bubble test and electronic leak detection
22.02.06	ability to clean joints
22.02.07	ability to disassemble and reassemble components

APPENDICES

TOOLS AND EQUIPMENT

Personal Protective Equipment and Safety Equipment

boot slip cover
drop sheets
fire extinguisher
first aid kit
gloves
goggles
hearing protection
respiratory mask
safety boots
shield
static pads

Common Measuring/Testing Equipment

calculator
clamp-on meter
measuring tape
microwave leak detector
multimeter
temperature recorders
test harnesses
test lights
thermometer
volt pen
water hardness test kit

Common Service Tools

Allen wrenches
clutch head wrenches
cold chisels
combination wrenches
crimping pliers
drifts
drill bits
drills
files (round, half-round, triangular, flat)
flashlight
hacksaws
hammer
heat guns
knife
ladders
lineman's pliers
needle nose pliers
nut drivers
pipe benders
pipe wrench
pullers
punches
ratchet/socket wrenches
scrapers
screwdrivers
side cutter pliers
sledge hammer
sliders
slip joint pliers
snap ring pliers
soft blow mallet
tamper proof/security bit set
tin snips
trouble light
vice grip pliers
water pump pliers
wire stripper

Specialty Dishwasher, Washer and Dryer Tools

agitator post puller
agitator removers
bearing installer
brake and clutch tools
centre post bearing pullers
hose clamp pliers
pinch off pliers
spanner wrench
tub nut wrench
tachometer

Specialty Refrigeration Tools

acid test kit
charging cylinder
compound gauges
condenser brush
electronic scale
fin comb
micron gauge
nitrogen pressure gauge
nitrogen tank
pinch off pliers
process tube adapter set
reamers
recovery/recycling equipment
refrigerant leak detector
steam gun
swedging and flaring tools
tubing cutters
vacuum pump

Specialty Gas Tools

carbon monoxide detector
combustible gas leak detector
manometer
pyrometer

Shop Tools

air compressor
air sleds
appliance carts
anti-static sheet
computer
dollies
grinder
impact tools
moving straps
power lift
saws
shop vacuum
staple gun
strapping machine
tape machine
taps and dies
torque wrench
truck lifts
vices
whetstone

Soldering and Brazing Tools

flame arrester
gauges
heat proof work mats
heat shield
propane and acetylene torches and tips
soldering gun

GLOSSARY

brazing	to solder two pieces of metal together using a hard solder with a high melting point. Brazing does not involve the melting of the base metal
conduction	the transmission or flow of heat from one body to another
convection	heat transfer in a gas or liquid by the circulation of currents from one region to another
drier	component used in refrigeration systems to remove contaminants such as moisture and dirt
forced air system	system that provides ventilation and heat transfer through mechanical movement of air
radiation	heat transfer by wave motion (rapid vibration). Heat transfer from one body to another without the need for intervening matter
snubber	part of the suspension system that provides friction to limit movement
soldering	using a soft alloy to join metals
static air system	system that transfers heat using air flow without mechanical assistance
swedge	to expand tubing size

BLOCK AND TASK WEIGHTING

BLOCK A OCCUPATIONAL SKILLS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	10	NV	NV	ND	4	ND	ND	20	3	7	ND	NV	9%

Task 1 Uses tools and equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	50	NV	NV	ND	75	ND	ND	60	75	40	ND	NV	60%

Task 2 Organizes work.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	50	NV	NV	ND	25	ND	ND	40	25	60	ND	NV	40%

BLOCK B REMOVAL AND INSTALLATION PROCEDURES

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	8	NV	NV	ND	5	ND	ND	5	2	8	ND	NV	6%

Task 3 Prepares installation site.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	35	NV	NV	ND	30	ND	ND	20	40	20	ND	NV	29%

Task 4 Handles appliance.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	15	NV	NV	ND	20	ND	ND	40	10	20	ND	NV	21%

Task 5 Disconnects/reconnects appliance.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	50	NV	NV	ND	50	ND	ND	40	50	60	ND	NV	50%

BLOCK C ELECTRICAL AND ELECTRONIC SYSTEMS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	22	NV	NV	ND	22	ND	ND	20	40	20	ND	NV	25%

Task 6 Diagnoses electrical and electronic components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	65	NV	NV	ND	56	ND	ND	60	80	50	ND	NV	62%

Task 7 Performs electrical and electronic repair.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	35	NV	NV	ND	44	ND	ND	40	20	50	ND	NV	38%

BLOCK D MECHANICAL SYSTEMS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	18	NV	NV	ND	18	ND	ND	15	15	20	ND	NV	17%

Task 8 Diagnoses drive systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	35	NV	NV	ND	37	ND	ND	30	45	40	ND	NV	38%

Task 9 Assesses cabinets, consoles and suspension systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	25	NV	NV	ND	17	ND	ND	15	45	10	ND	NV	22%

Task 10 Repairs drive systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	20	NV	NV	ND	30	ND	ND	40	5	40	ND	NV	27%

Task 11 Repairs cabinets, consoles and suspension systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	20	NV	NV	ND	16	ND	ND	15	5	10	ND	NV	13%

BLOCK E WATER SYSTEMS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	14	NV	NV	ND	16	ND	ND	10	10	20	ND	NV	14%

Task 12 Diagnoses water systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	65	NV	NV	ND	58	ND	ND	50	90	50	ND	NV	63%

Task 13 Repairs water systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	35	NV	NV	ND	42	ND	ND	50	10	50	ND	NV	37%

BLOCK F AIR SYSTEMS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	12	NV	NV	ND	10	ND	ND	10	5	10	ND	NV	9%

Task 14 Diagnoses static air systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	25	NV	NV	ND	20	ND	ND	10	45	10	ND	NV	22%

Task 15 Diagnoses forced air systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	35	NV	NV	ND	37	ND	ND	30	45	35	ND	NV	36%

Task 16 Repairs static air systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	15	NV	NV	ND	15	ND	ND	10	5	20	ND	NV	13%

Task 17 Repairs forced air systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	25	NV	NV	ND	28	ND	ND	50	5	35	ND	NV	29%

BLOCK G REFRIGERATION SYSTEMS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	16	NV	NV	ND	20	ND	ND	15	20	10	ND	NV	16%

Task 18 Diagnoses refrigeration systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	50	NV	NV	ND	36	ND	ND	50	70	60	ND	NV	53%

Task 19 Recovers refrigerant.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	15	NV	NV	ND	16	ND	ND	10	10	20	ND	NV	14%

Task 20 Repairs refrigeration systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	35	NV	NV	ND	48	ND	ND	40	20	20	ND	NV	33%

BLOCK H GAS SYSTEMS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	NV	0	NV	NV	ND	5	ND	ND	5	5	5	ND	NV	4%

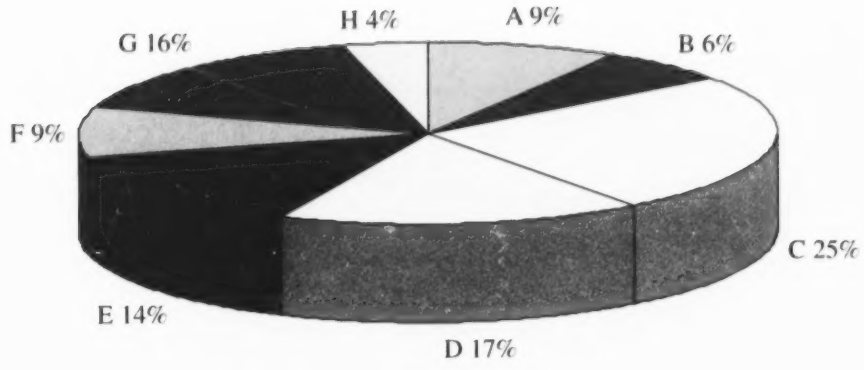
Task 21 Diagnoses gas system components and supply.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	0	NV	NV	ND	51	ND	ND	60	80	50	ND	NV	60%

Task 22 Repairs gas system components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	NV	0	NV	NV	ND	49	ND	ND	40	20	50	ND	NV	40%

PIE CHART*



TITLES OF BLOCKS

Block A	Occupational Skills	Block E	Water Systems
Block B	Removal and Installation Procedures	Block F	Air Systems
Block C	Electrical and Electronic Systems	Block G	Refrigeration Systems
Block D	Mechanical Systems	Block H	Gas Systems

* Average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. Interprovincial examinations typically have from 100 to 150 multiple-choice questions.

TASK PROFILE CHART – APPLIANCE SERVICE TECHNICIAN (2005)

BLOCKS	TASKS	SUB-TASKS					
A OCCUPATIONAL SKILLS	**1. Uses tools and equipment.**	1.01 Uses hand tools.	1.02 Uses power tools.	1.03 Uses diagnostic and measuring tools.	1.04 Uses soldering and brazing equipment.	1.05 Uses recovery equipment.	1.06 Uses personal protective equipment (PPE) and safety equipment.
		1.07 Uses computers.					
	2. Organizes work.	2.01 Uses documentation.	2.02 Communicates with others.	2.03 Manages parts and materials.	2.04 Verifies appliance and component operation following servicing or installation.		
B REMOVAL AND INSTALLATION PROCEDURES	**3. Prepares installation site.**	3.01 Checks flooring support.	3.02 Verifies appliance location.	3.03 Verifies water, power, drain, venting and gas connections.	3.04 Updates venting.		
	4. Handles appliance.	4.01 Uncrates appliance.	4.02 Moves appliance.	4.03 Sets up appliance.			
	5. Disconnects/ reconnects appliance.	5.01 Disconnects/ reconnects water, power, drain, gas and venting.	5.02 Performs final inspection of connections.	5.03 Converts gas appliances.			
C ELECTRICAL AND ELECTRONIC SYSTEMS	**6. Diagnoses electrical and electronic components.**	6.01 Verifies power supply.	6.02 Inspects electrical and electronic components and circuits.	6.03 Tests electrical and electronic components and circuits.	6.04 Reads schematics and flow charts.		
	7. Performs electrical and electronic repair.	7.01 Repairs wiring and connectors.	7.02 Repairs electrical and electronic components.				

APPLIANCE SERVICE TECHNICIAN (2005)

BLOCKS	TASKS	SUB-TASKS			
D MECHANICAL SYSTEMS	**8. Diagnoses drive systems.**	8.01 Performs sensory inspections.	8.02 Tests drive system components.		
	9. Assesses cabinets, consoles and suspension systems.	9.01 Visually inspects cabinets and consoles.	9.02 Diagnoses suspension systems.		
	10. Repairs drive systems.	10.01 Repairs drive system components.	10.02 Replaces drive system components.		
	11. Repairs cabinets, consoles and suspension systems.	11.01 Repairs cabinet and console components.	11.02 Services suspension system.		
E WATER SYSTEMS	**12. Diagnoses water systems.**	12.01 Verifies water supply.	12.02 Diagnoses water inlet and discharge components.	12.03 Isolates water leaks.	
	13. Repairs water systems.	13.01 Replaces water system components.	13.02 Repairs water system components.		
F AIR SYSTEMS	**14. Diagnoses static air systems.**	14.01 Checks location of appliance.	14.02 Verifies air circulation.		
	15. Diagnoses forced air systems.	15.01 Checks installation.	15.02 Performs sensory inspection of forced air system.	15.03 Checks air flow.	15.04 Checks forced air system components.
	16. Repairs static air systems.	16.01 Relocates appliance.	16.02 Cleans condensers and evaporators.	16.03 Clears static air venting.	

APPLIANCE SERVICE TECHNICIAN (2005)

BLOCKS	TASKS	SUB-TASKS					
	17. Repairs forced air systems.	17.01 Clears airways.	17.02 Replaces forced air system components.				
G **REFRIGERATION SYSTEMS**	**18. Diagnoses refrigeration systems.**	18.01 Checks for system leaks.	18.02 Checks condenser and drier temperature and air flow.	18.03 Observes pressure of sealed refrigeration system.	18.04 Checks thermal electric refrigeration system. **(NOT COMMON CORE)**		
	19. Recovers refrigerant.	19.01 Assesses type of refrigerant.	19.02 Accesses sealed system.	19.03 Evacuates sealed system to recovery units and recovery bottle.			
	20. Repairs refrigeration systems.	20.01 Prepares tubing for connections.	20.02 Replaces sealed refrigeration system components.	20.03 Evacuates system.	20.04 Charges system.	20.05 Replaces thermal electric system components. **(NOT COMMON CORE)**	
H **GAS SYSTEMS**	**21. Diagnoses gas system components and supply.**	21.01 Identifies type of gas.	21.02 Assesses flame quality.	21.03 Checks ignition system.	21.04 Checks for gas leaks.	21.05 Verifies gas valve operation.	21.06 Ensures conversion has been performed for type of gas.
	22. Repairs gas system components.	22.01 Replaces gas system components.	22.02 Repairs gas leaks.				